

**A New Species of Capuchin Monkey, Genus *Cebus* Erxleben, 1777
(Cebidae: Primates) from Eastern Brazilian Amazonia**

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ABSTRACT — The Kaapor Capuchin *Cebus kaapori* sp.n. from the Municipality of Carutapera, Maranhão, Brazil, is described. A comparison between this form and other capuchin monkey species is presented. The limits of the geographical distribution of the new species and its conservation status are discussed.

KEY WORDS — *Cebus kaapori* sp.n., Primates, Cebidae, Capuchin Monkey, Brazilian Amazonia, Taxonomy and Systematics, Geographical Distribution, Ka'apor Indians

RESUMO — O cairara caapor *Cebus kaapori* sp.n., do Município de Carutapera, Estado do Maranhão, Brasil, é descrito. Uma comparação desta com as outras espécies do gênero é apresentada e discutem-se ainda os limites da distribuição geográfica e o status de conservação da nova espécie.

PALAVRAS-CHAVE — *Cebus kaapori* sp.n., Primatas, Cebidae, Cairara, Amazônia Brasileira, Taxonomia e Sistemática, Distribuição Geográfica, Índios Ka'apor

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TAXONOMY OF THE CAPUCHIN MONKEYS

The genus *Cebus* Erxleben, 1777, is generally seen as the taxonomically most complex of the New World primates (Lima 1945; Hill 1960; Mittermeier & Coimbra-Filho 1981). During the past few decades the consensus of specialists (Hershkovitz 1949, 1972; Eisenberg 1989; Emmons 1990) is that the genus should be divided into four species. *Cebus* is usually separated into two groups on the basis of the presence or absence of tufts of dark hair on the frontal crown (top of head). The "untufted" species are *C. albifrons*, *C. nigrivittatus* and *C. capucinus*, while the "tufted" group includes only *C. apella* (Mittermeier & Coimbra-Filho 1981; Mittermeier, Rylands & Coimbra-Filho 1988). Some authors question the species status of the untufted forms, especially given the lack of sympatry between them, a characteristic usually explained by competitive exclusion (see Torres de Assumpção 1983, for a more detailed discussion).

White-throated capuchin monkeys, *Cebus capucinus* Linnaeus, 1758, have black upper parts (except for the sides of neck), shoulders and upper arms sharply contrasting pale yellow to whitish ventrally. The head is yellow with a V-shaped black cap on the crown (Emmons 1990). *C. capucinus* ranges from Belize to northern Colombia (Freese & Oppenheimer 1981). Brown capuchin monkeys, *Cebus apella* Linnaeus 1758, while being the most morphologically variable of the genus, is the only "tufted" species. With dark brown upper parts, the shoulders of brown capuchin monkeys are paler than the back. The crown is completely covered with a black or dark brown cap that extends down the cheek, becoming a distinct dark bar in front of the ear. This cap can also form horns of hair above the ears in males. The hands, hindlimbs and feet are black or dark brown, as is the tail, which is darker at the tip (Emmons 1990). *C. apella*, the most widely distributed neotropical primate species, ranges from extreme northern South America to northern Argentina (Brown & Colillas 1984). White-fronted capuchin monkeys, *Cebus albifrons* Humboldt 1812, have pale smokey grey-brown upper parts, and yellowish brown or reddish brown fore- and hindlimbs. The face is fringed with silvery white, with white hairs circling the facial region. The crown has a sharp, wedge-shaped cap of dark smokey brown, generally extending forwards as a thin stripe down the center of the face. The tail is smokey silvery yellow, paler at the tip than at the base (Emmons 1990). This species occurs from southern Colombia and Venezuela south through the Amazon basin to northern Bolivia (Eisenberg 1989). The eastern limit is formed by the Negro and Tapajós rivers (Emmons 1990). Wedge-capped or weeping capuchin monkeys, *Cebus nigrivittatus* Wagner, 1848 (or *Cebus olivaceus* Schomburgk, 1848), are a uniform tawny brown on the upper parts, sometimes being frosted with dirty yellow. The shoulders and upper arms are silvery yellow and the back of the head and neck is reddish. The head is brownish yellow with a sharp V-shaped dark brown cap, and a thin brown stripe

down the center of the face as far as the nose. The hands, wrists and feet are dark brown. *C. nigrivittatus* is distributed in northern South America from northern Venezuela across the Guyanas (Eisenberg 1989), with its western limit at the Negro river and southern limit at the Amazonas river.

A minor problem of nomenclature exists in the case of the use of *C. nigrivittatus* and *C. olivaceus* (Mittermeier & Coimbra-Filho 1981; Eisenberg 1989 and Emmons 1990). Freese & Oppenheimer (1981) and Mittermeier & Coimbra-Filho (1981) use *nigrivittatus*, while Mittermeier, Rylands and Coimbra-Filho (1988) follow Robinson (1986) and Robinson & Janson (1987) in using *olivaceus*. Eisenberg (1989) and Emmons (1990) also prefer the latter, although here I shall use *nigrivittatus* pending the review of the genus by Hershkovitz.

Cebus apella is sympatric over large areas with *C. nigrivittatus* and *C. albifrons* (Hill 1960; Freese & Oppenheimer 1981). No other cases of sympatry between two species of *Cebus* have been reported.

In contrast with the consensus existing at the specific level, there is little agreement on the taxonomy of subspecific forms. Relatively small samples from regions where populations intergrade are responsible for much of the confusion (Hershkovitz 1949; Torres de Assumpção 1983). Kinzey (1980) described five subspecies of *C. apella*, while Hershkovitz (1949) recognized thirteen subspecies of *C. albifrons*, five of *C. nigrivittatus* and five of *C. capucinus*. Hill (1960) described a large number of subspecies for each one of the four species, but further studies must be conducted to help resolve these questions (Mittermeier, Rylands & Coimbra-Filho 1988). Studying the morphological characteristics of more than 750 specimens of *C. apella*, Torres de Assumpção (1983, 1986) identified six geographical areas where the species showed some stability, and suggested that the interpretation of her data in terms of the subspecies of *C. apella* depends on the level of interbreeding between these areas, which have been geographically isolated in the past. Subspecies for the unsplit group can be considered as provisional. In the case of *C. nigrivittatus*, for example, the lack of any systematic intraspecific variation (as shown in Hershkovitz 1971) makes taxonomy at the subspecific level extremely questionable (John G. Robinson, personal communication 1991).

A NEW CAPUCHIN MONKEY SPECIES FROM BRAZILIAN AMAZONIA

An undescribed form of untufted capuchin was recently encountered during field work among the Ka'apor Indians of Gurupiuna Village, in the Alto Turiaçu Indian Reservation of the Brazilian state of Maranhão. This site was previously considered to be outside the geographical range of the untufted species group. The first specimen observed had been hunted by the indians, who preserved its skin and skull, which is described here as the paratype. The ka'apor capuchin, here designated *Cebus kaapori* sp.n., was subsequently seen in the wild in this same reservation, in the Caru Indian Reservation, also in Maranhão (where these animals are raised as pets by the Guajá indians) and at other sites outside these reservations in the northwest of Maranhão, where the holotype was collected.

Cebus kaapori sp.n.

Holotype: Juvenile female, skeleton and stuffed skin preserved (Figure 1). Collected at Quadrant 7, 10 km southwest of the Chega-Tudo Prospection (02°30'S, 47°30'W) (Carutapera, MA), near the right bank of the Gurupi river, Maranhão, Brazil (Figure 2). Helder L. Queiroz coll. on 24th of August 1991. The holotype is deposited in the zoological collection of the Museu Paraense Emílio Goeldi, Belém, Pará, Brazil, registered as specimen MPEG 22025.

Paratype: Adult male, skull and unstuffed, preserved skin. Collected at Gurupiuna village (02°40'S, 46°20'W) in the Alto Turiaçu Indian Reservation, Maranhão, Brazil, on the right or eastern bank of the Gurupi river (see Figure 1). Helder L. Queiroz and Ferdinando C. Nascimento colls. on 5th of March 1990. Deposited in the zoological collection of the Museu Paraense Emílio Goeldi, Belém, Pará, Brazil, registered as specimen MPEG 21978.

Diagnosis: The longest-bodied untufted species of capuchin monkey, with a silvery agouti mantle and silvery grey shoulders and tip of tail. Arms and hindlimbs agouti. Hands and feet black and dark brown. Triangular black cap at crown with a black stripe down to nose. Forehead and face silvery grey and beige. Occurring south of Amazonas river, possibly restricted to the area between Gurupi and Pindaré rivers in Maranhão State, Brazil.





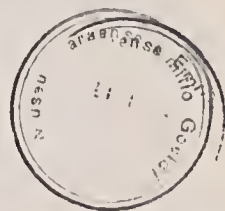
Figure 1. The holotype of *Cebus kaapori* sp.n. MPEG 22025. Stuffed skin and skull.



Figure 2. The proposed limits of the geographical distribution of *Cebus kaapori* sp.n., the type locality and site where the animals were seen and observed. The protected areas within the geographical distribution are also shown, as well as the highways, roads and railroad and the places where interviews were performed (numbered as follows): 1-Gurupi; 2-Quatro Bocas; 3-Maraçumé; 4-Garimpo Limão; 5-Encruzo; 6-Maranhãozinho; 7-Bela Vista; 8-Santa Luzia do Pará; 9-Nova Olinda; 10-Araguanã; 11-Zé Doca; 12-Chapéu de Couro; 13-Bom Jardim; 14-Santa Inês; 15-Pindaré Mirim; 16-Santa Luzia; 17-Floresta; 18-Santo Onofre; 19-Burititupu; 20-Fazenda Varig; 21-Piquiá; 22-Açailândia; 23-Imperatriz and 24-Gurupiuna Village.

Geographical Distribution: In order to determine the geographical distribution of the new species, observations of animals in the wild and interviews with local residents were carried out along the Pará-Maranhão highway (BR-316), the Santa Inês-Imperatriz highway (BR-222) and the Carajás railroad. The towns visited and the sites at which Kaapor capuchins were observed are shown in Figure 1. This may be one of the smallest geographical ranges of an Amazonian cebid primate, being restricted in the present day to the area between Gurupi and Pindaré rivers, in Maranhão state. The northeastern limit of the new species's range is the border of the Amazonian lowland high forest within the "Cocais" ecosystem of middle Maranhão, extending at some points to the right or eastern bank of Pindaré river, in its middle reaches, west of Santa Luzia. The southeastern limit is defined by the distribution of the Amazonian forest. Although not all small fragments of disturbed forest have been surveyed, the presence of the new species south or east of this ecosystem seems unlikely. The northern limit of the geographical distribution lies south of Maracaçumé, in the Maracaçumé river basin, and the southern limit is the northernmost forests of Buriticupu. The western limit of the distribution is still unknown, but it may be the Gurupi river. However, some interviews indicate that the kaapor capuchin exists 5-10 km west of this river. I believe that the geographical distribution of *kaapori* extended as far as the right bank of Amazon river in the past (see below), but is now mostly restricted to Maranhão State. Human colonization from the west and northwest, and the transformation of habitat to "Cocais" (also as a result of human activity) from the east has determined the present distribution of the species. *C. kaapori* sp.n. is sympatric with *C. apella* throughout its present distribution, but always at lower population densities.

Habitat: *C. kaapori* sp.n. was only observed in undisturbed and slightly disturbed dense lowland Amazonian high forest ("mata-alta-de-terra-firme") under 200 m of altitude, in very low densities. The interviews indicate that the new species can also be found in edge habitats between the Amazonian and the "Cocais" forest, due to its ability to feed on palm nuts. The new species was seen in the neighborhood of indian gardens, in old fallows ("capoeiras velhas") and pristine high forest. Guajá indians, who raise these animals as pets, reported that *C. kaapori* sp.n. can feed on palm fruits and are thus able to live in "Cocais" forest. Miners and hunters from northwestern Maranhão also reported that *C. kaapori* forms mixed groups with *C. apella*, but no such groups were observed.



Description: General aspect grayish agouti-brown, with the brown stripe on the dorsal mid-line less marked than in other species of the genus. Grayish light brown at sides. Shoulders silvery grey and beige extending to the proximal part of the arm. The distal part of the forelimb is agouti turning dark brown and black on wrists. Hands dark brownish black. Legs are equally agouti and beige proximally and brownish black distally. Feet are blackish, like the hands. Tail is grayish agouti at base, turning silvery grey and beige at tip. Except for dorsal mid-line hairs, there are agouti bands at tip and silvery bands at base of mantle hairs. Hairs from the dorsal mid-line are entirely dark brown agouti. Close to hands and feet, hairs are agouti at tip and black at base, but on the arm, hairs are banded with black, brown and silvery grey and beige; bands browner close to wrists and more beige near shoulders. Hairs from the shoulders are brown at base and silvery grey or beige at tip. Tail hairs are black or dark brown at base and brown agouti and beige at tip, turning to silvery grey and beige on hair tip distally. Hairs completely silvery grey and completely beige are found ventrally along the tail and at its tip on both surfaces. Similar hairs are also found on the neck (ventrally), and mixed with entirely beige hairs in the thoracic and abdominal regions. Inner parts of legs and arms have entirely light brown agouti or black hairs. The brown mid-line hairs turn dark brownish and brownish black to black, forming longer, thinner fur on the cap, continuing onto the crown and then shorter when reaching the face. The face is pink or flesh-like in nature, with small white and silvery grey and beige hairs on the cheeks, moustache and chin. Forehead and regions between cheeks and ears are silvery grey and beige, and the hairs have small black bands. Ears are almost naked and pink in nature. Lips and nose are also naked, but almost black in nature with small black hairs. Eyebrows are silvery grey and beige, but some black hairs are found. The cap starts back of the head, but is only prominent on the crown. Composed of long black hairs, the cap is triangular in shape, with a thin black stripe of very small hairs stretching down to the nose, crossing forehead between the eyes.

Discussion: In general appearance, *C. kaapori* sp.n. is most similar to *C. nigrivittatus*, but the kaapor capuchin's geographical range is separated from that of the weeping capuchin by more than 400 km. *Cebus kaapori* sp.n. has a silvery agouti mantle, and its tail is brown turning to silvery grey at tip, while the forms of *nigrivittatus* from eastern Venezuela and Guyanas have a brown reddish or copper mantle, and those from the region of the Branco river of Amazonas state have grayish or dark grayish mantles. Tails are always darker in these forms. The nape is blackish dark brown, contrasting with the copper nape of *C. nigrivittatus*. The shoulders of *kaapori* are silvery grey and the arms and hindlimbs are agouti.

MEASUREMENTS AND COMPARISONS WITH OTHER CAPUCHIN SPECIES

With only a single adult specimen available (the paratype), it is impossible to analyze intraspecific variation in *Cebus kaapori* sp.n., and difficult to draw detailed conclusions on interspecific variation within the genus. The new form appears to be longer-bodied and less robust than other untufted species, but there is little to separate the species on the basis of most craniometric and morphological characteristics. External and craniometric measurements from the paratype of *Cebus kaapori* sp.n. are presented in Tables 1 and 2, respectively, and compared with values taken from the literature for the remaining four species of the genus. No cranial measurements were available for *C. nigrivittatus* in the literature, and five *nigrivittatus* crania from the Goeldi Museum collection (MPEG 993, MPEG 994, MPEG 1235, MPEG 1284 and MPEG 1633) are given in Table 2. Because of the marked sexual dimorphism of the genus (Torres de Assumpção 1986), only males specimens are used here. Table 1 shows that *C. kaapori* is longer-bodied than all other untufted species, overlapping with only *C. apella*.

The new species is undoubtedly similar to *C. nigrivittatus*, but the distance between the geographical ranges of *C. nigrivittatus* and *C. kaapori*, and the resulting absence of interbreeding between these populations suggest that other speciation processes have occurred, and that *C. kaapori* is a true species. In addition, Table 2 suggests that *C. nigrivittatus* has a longer maximum cranial length than all other species of the genus, including *C. kaapori*, suggesting a degree of divergence of these two forms.

Table 1. External measurements of the paratype of *Cebus kaapori* sp.n. and the range of measurements for other species of the genus (from Emmons 1990).

Species	Head/Body (mm)	Tail (mm)	Foot* (mm)	Ear (mm)	Weight (kg)
<i>Cebus capucinus</i>	335-453	350-551	110-150	21-42	1.4-3.9
<i>Cebus apella</i>	350-488	375-488	107-132	28-43	1.7-4.5
<i>Cebus albifrons</i>	358-460	401-475	112-136	32-45	1.2-3.6
<i>Cebus olivaceus</i> +	374-460	400-554	120-143	35-51	2.3-4.2
<i>Cebus kaapori</i>	465	510	122/123	33	3.05

+ Sensu Robinson (1986), or *C. nigrivittatus*.

* Foot without and with nail, respectively

Table 2. Craniometric measurements of the paratype of *Cebus kaapori* sp.n. and of other species of the genus.

Measurements	<i>C. capuc</i> * (1 ♂)	<i>C. albifr</i> * (18 ♂♂)	<i>C. nigriv</i> (5 ♂♂)	<i>C. kaapori</i> (1 ♂)	<i>C. apella</i> * (1 ♂)
Maximum Cranial Length	95.3	92.8	100.6	94.5	94.5
Maximal Cranial Breadth	56.0	50.8	56.2	52.7	53.1
Bizygomatic	61.0	61.8	67.1	61.5	60.5
Biorbital	52.4	51.8	48.8	45.5	44.8
Upper cheek-teeth	21.7**	26.3	29.8	21.0	27.8
Lower cheek-teeth	25.4**	29.0	33.9	29.3	31.5

* From Hill 1960.

** Without canines.

DISTRIBUTION AND CONSERVATION STATUS OF THE NEW SPECIES

Six untufted capuchins were collected in 1897 on the Acará and Capim rivers (south of Belém, Pará) and deposited in the zoological collection of the Goeldi Museum by Goeldi & Hagmann (1906). While the specimens were denominated *Cebus capucinus*, their description was highly similar to that of *Cebus kaapori* sp.n. reported above. At the time, the name *capucinus* was applied also to *nigrivittatus*. Unfortunately, these specimens were not found in the Goeldi Museum, and have probably been lost, but their description suggests that the western limit of the distribution of *Cebus kaapori* was much closer to Belém in the past. Surprisingly, this report has been overlooked in all subsequent revisions of the genus, and even in studies of *C. nigrivittatus*. If the present geographical distribution of *C. kaapori* sp.n. is confirmed as described here, this new species would range over a total area of approximately 15,000 km², one of the smallest ranges of an Amazonian cebid.

As shown in Figure 2, this area encompasses the Gurupi Biological Reserve, and the Caru and Alto Turiaçu Indian Reservations, where *Cebus kaapori* sp.n. is a game species for local indians. In addition, the Gurupi reserve is subject to continuous invasion by loggers. All three protected areas, representing almost 1,000,000 ha, are threatened not only by loggers, but also by gold miners, squatters and ranchers.

There are also highways and minor roads in the area (Figure 2), and the Carajás railroad has had a significant influence on colonization in the region. Innumerable small towns have thus been established in the vicinity of these protected areas and their inhabitants usually invade these areas to hunt, fish or collect forest resources.

Considering all these problems, *Cebus kaapori* sp. n. may be seen as a threatened species. The contiguous protected areas seen in Figure 2 may nevertheless represent a viable alternative for the protection of the new species until a systematic conservation program can be formulated.

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REFERENCES

- BROWN, A.D. & COLILLAS, O.J. 1984. Ecologia de *Cebus apella*. In: MELLO, M.T. (ed.) *A Primatologia no Brasil*. Brasília, Sociedade Brasileira de Primatologia, v.1.
- EISENBERG, J.F. 1989. *Mammals of the Neotropics*. Chicago, The University of Chicago Press, v.1.
- EMMONS, L.H. 1990. *Neotropical Rainforest Mammals - A Field Guide*. Chicago, The University of Chicago Press.
- FREESE, C. & OPPENHEIMER, J.R. 1981. The Capuchin Monkeys, Genus *Cebus*. In: MITTERMEIER, R.A. & COIMBRA-FILHO (eds). *Ecology and Behavior of Neotropical Primates*. Rio de Janeiro, Academia Brasileira de Ciências, v.1.
- GÖELDI, E.A. & HAGMANN, G. 1906. Prodrómo de um catálogo crítico, commentado, da coleção de mamíferos no Museu do Pará (1894-1903). *Bol. Mus. Goeldi (Mus. Para.) Hist. Nat. Ethnogr.* 4: 38-122.
- HERSHKOVITZ, P. 1949. Mammals of northern Colombia. Preliminary report no. 4: Monkeys (Primates), with taxonomic revisions of some forms. *Proc. U.S. Natn. Mus.*, Washington, 3232: 52-59.
- HERSHKOVITZ, P. 1971. Stapedial processes in tympanic cavities of capuchin monkeys (*Cebus*). *J. Mammalogy* 52(3): 607-609.

- HERSHKOVITZ, P. 1972. The Recent Mammals of Neotropical Region: A Zoogeographic and Ecological Review. In: KEAST, A.; ERK, F.C. & GLASS, B. (eds). *Evolution, Mammals, and Southern Continents*. New York, State University of New York.
- HILL, W.C.O. 1960. *Primates. Comparative Anatomy and Taxonomy. Cebidae*. Edinburgh, Edinburgh University Press, v.4. part A.
- KINZEY, W. 1980. Distribution of some Neotropical primates and the model of Pleistocene forest refugia. INTERNATIONAL SYMPOSIUM, ASSOCIATION OF TROPICAL BIOLOGY, 5, *PROCEEDINGS*, Caracas. New York, Columbia University Press.
- LIMA, E.C. 1945. *Mammals of Amazonia*. Belém, Museu Paraense Emílio Goeldi de Historia Natural e Etnografia. v.1.
- MITTERMEIER, R.A. & COIMBRA-FILHO, A.F. 1981. Systematics: Species and Subspecies. In: MITTERMEIER, R.A. & COIMBRA-FILHO, A.F. (eds) *Ecology and Behavior of Neotropical Primates*. Rio de Janeiro, Academia Brasileira de Ciências, v.1.
- MITTERMEIER, R.A.; RYLANDS, A.B. & COIMBRA-FILHO, A.F. 1988. Systematics: Species and Subspecies - An Update. In: MITTERMEIER, R.A.; RYLANDS, A.B.; COIMBRA-FILHO, A.F. & FONSECA, G.A.B. (eds) *Ecology and Behavior of Neotropical Primates*. Washington, WWF Press, v.2.
- ROBINSON, J.G. 1986. Seasonal variation in use of time and space by the wedge-capped capuchin monkey, *Cebus olivaceus*: implications for foraging theory. *Smithson. Contrib. Zool.* 431: 1-160.
- ROBINSON, J.G. & JASON, C.H. 1987. Capuchins, Squirrel Monkeys, and Atelines: Socioecological Convergence with Old World Primates. In: SMUTS, B.B.; CHENEY, D.L.; SEYFARTH, R.M.; WRANGHAM, R.W. & STRUHSAKER, T.T. (eds). *Primate Societies*. Chicago, University of Chicago Press.
- TORRES DE ASSUMPÇÃO, C. 1983. *An Ecological Study of the Primates of Southeastern Brazil, With a Reappraisal of Cebus apella Races*. Edinburgh, University of Edinburgh. Ph.D. Thesis.
- TORRES DE ASSUMPÇÃO, C. 1986. Resultados Preliminares da Reavaliação das Raças do Macaco-Prego *Cebus apella* (Primates, Cebidae). In: MELLO, M.T. (ed) *A Primatologia no Brasil*. Brasília, Sociedade Brasileira de Primatologia. v.2.

